

## § 7.101

## 30 CFR Ch. I (7–1–11 Edition)

inches to the lowest water level that passed the explosion tests.

(v) A determination shall be made of the maximum grade on which the wet exhaust conditioner can be operated retaining the flame-arresting characteristics.

(b) *Acceptable performance.* The explosion tests shall not result in any of the following—

(1) Discharge of flame or glowing particles.

(2) Visible discharge of gas through gasketed joints.

(3) Ignition of the flammable mixture in the test chamber.

(4) Rupture of any part that affects the explosion-proof integrity.

(5) Clearances, in excess of those specified in this subpart, along accessible flame-arresting paths, following any necessary retightening of fastenings.

(6) Pressure exceeding 110 psig, unless the intake system or exhaust system has withstood a static pressure of twice the highest value recorded in the explosion tests of this section following the static pressure test procedures of § 7.104.

(7) Permanent distortion of any planar surface of the diesel power package exceeding 0.04-inches/linear foot.

(8) Permanent deformation exceeding 0.002-inch between the plates of spaced-plate flame arrester designs.

[61 FR 55518, Oct. 25, 1996; 62 FR 34641, June 27, 1997]

### § 7.101 Surface temperature tests.

The test for determination of exhaust gas cooling efficiency described in § 7.102 may be done simultaneously with this test.

(a) *Test procedures.* (1) Prepare to test the diesel power package as follows:

(i) Perform a detailed check of parts against the drawings and specifications submitted to MSHA under compliance with § 7.97 to determine that the parts and drawings agree.

(ii) Fill the coolant system with a mixture of equal parts of antifreeze and water, following the procedures specified in the application, § 7.97(a)(3).

(iii) If a wet exhaust conditioner is used to cool the exhaust gas, fill the exhaust conditioner to the high or nor-

mal operating water level and have a reserve water supply available, if applicable.

(2) Tests shall be conducted as follows:

(i) The engine shall be set to the rated horsepower specified in § 7.97(a)(2).

(ii) Install sufficient temperature measuring devices to determine the location of the highest coolant temperature. The temperature measuring devices shall be accurate to  $\pm 4^\circ\text{F}$  ( $\pm 2^\circ\text{C}$ ).

(iii) Operate the engine at rated horsepower and with  $0.5 \pm 0.1$  percent, by volume, of methane in the intake air mixture until all parts of the engine, exhaust coolant system, and other components reach their respective equilibrium temperatures. The liquid fuel temperature into the engine shall be maintained at  $100^\circ\text{F}$  ( $38^\circ\text{C}$ )  $\pm 10^\circ\text{F}$  ( $6^\circ\text{C}$ ) and the intake air temperature shall be maintained at  $70^\circ\text{F}$  ( $21^\circ\text{C}$ )  $\pm 5^\circ\text{F}$  ( $3^\circ\text{C}$ ).

(iv) Increase the coolant system temperatures until the highest coolant temperature is  $205^\circ\text{F}$  to  $212^\circ\text{F}$  ( $96^\circ\text{C}$  to  $100^\circ\text{C}$ ), or to the maximum temperature specified by the applicant, if lower.

(v) After all coolant system temperatures stabilize, operate the engine for 1 hour.

(vi) The ambient temperature shall be between  $50^\circ\text{F}$  ( $10^\circ\text{C}$ ) and  $104^\circ\text{F}$  ( $40^\circ\text{C}$ ) throughout the tests.

(b) *Acceptable performance.* The surface temperature of any external surface of the diesel power package shall not exceed  $302^\circ\text{F}$  ( $150^\circ\text{C}$ ) during the test.

### § 7.102 Exhaust gas cooling efficiency test.

(a) *Test procedures.* (1) Follow the procedures specified in § 7.101(a).

(2) Install a temperature measuring device to measure the exhaust gas temperature at discharge from the exhaust conditioner. The temperature measuring device shall be accurate to  $\pm 4^\circ\text{F}$  ( $\pm 2^\circ\text{C}$ ).

(3) Determine the exhaust gas temperature at discharge from the exhaust conditioner before the exhaust gas is diluted with air.

(b) *Acceptable performance.* (1) The exhaust gas temperature at discharge

from a wet exhaust conditioner before the exhaust gas is diluted with air shall not exceed 170 °F (76 °C).

(2) The exhaust gas temperature at discharge from a dry exhaust conditioner before the gas is diluted with air shall not exceed 302 °F (150 °C).

**§ 7.103 Safety system control test.**

(a) *Test procedures.* (1) Prior to testing, perform the tasks specified in § 7.101(a)(1) and install sufficient temperature measuring devices to measure the highest coolant temperature and exhaust gas temperature at discharge from the exhaust conditioner. The temperature measuring devices shall be accurate to  $\pm 4$  °F ( $\pm 2$  °C).

(2) Determine the effectiveness of the coolant system temperature shutdown sensors which will automatically activate the safety shutdown system and stop the engine before the coolant temperature in the cooling jackets exceeds manufacturer's specifications or 212 °F (100 °C), whichever is lower, by operating the engine and causing the coolant in the cooling jackets to exceed the specified temperature.

(3) For systems using a dry exhaust gas conditioner, determine the effectiveness of the temperature sensor in the exhaust gas stream which will automatically activate the safety shutdown system and stop the engine before the cooled exhaust gas temperature exceeds 302 °F (150 °C), by operating the engine and causing the cooled exhaust gas to exceed the specified temperature.

(4) For systems using a wet exhaust conditioner, determine the effectiveness of the temperature sensor in the exhaust gas stream which will automatically activate the safety shutdown system and stop the engine before the cooled exhaust gas temperature exceeds 185 °F (85 °C), with the engine operating at a high idle speed condition. Temporarily disable the reserve water supply, if applicable, and any safety shutdown system control that might interfere with the evaluation of the operation of the exhaust gas temperature sensor. Prior to testing, set the water level in the wet exhaust conditioner to a level just above the minimum allowable low water level. Run the engine until the exhaust gas temperature sen-

sor activates the safety shutdown system and stops the engine.

(5) For systems using a wet exhaust conditioner as an exhaust flame arrester, determine the effectiveness of the low water sensor which will automatically activate the safety shutdown system and stop the engine at or above the minimum allowable low water level established from results of the explosion tests in § 7.100 with the engine operating at a high idle speed condition. Temporarily disable the reserve water supply, if applicable, and any safety shutdown system control that might interfere with the evaluation of the operation of the low water sensor. Prior to testing, set the water level in the wet exhaust conditioner to a level just above the minimum allowable low water level. Run the engine until the low water sensor activates the safety shutdown system and stops the engine. Measure the low water level. Attempt to restart the engine.

(6) Determine the effectiveness of the device in the intake system which is designed to shut off the air supply and stop the engine for emergency purposes with the engine operating at both a high idle speed condition and a low idle speed condition. Run the engine and activate the emergency intake air shutoff device.

(7) Determine the total air inlet restriction of the complete intake system, including the air cleaner, as measured between the intake flame arrester and the engine head with the engine operating at maximum air flow.

(8) Determine the total exhaust backpressure with the engine operating at rated horsepower as specified in § 7.103(a)(7). If a wet exhaust conditioner is used, it must be filled to the high or normal operating water level during this test.

(9) The starting mechanism shall be tested to ensure that engagement is not possible while the engine is running. Operate the engine and attempt to engage the starting mechanism.

(10) Where the lack of engine oil pressure must be overridden in order to start the engine, test the override to ensure that it does not override any of the safety shutdown sensors specified in § 7.98(i). After each safety shutdown sensor test specified in paragraphs